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| 10/006,704 | 12/10/2001 | Shane J. Trapp | M4065.0369/P369-A | 3229 |
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| DICKSTEIN SHAPIRO LLP 1825 EYE STREET NW Washington, DC 20006-5403 | | | EXAMINER UMEZ ERONINI, LYNETTE T | |
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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

| | | | |
|------------------------------|--|--|--|
| Office Action Summary | Application No. 10/006,704 | Applicant(s) TRAPP, SHANE J. | |
| | Examiner Lynette T. Umez-Eronini | Art Unit 1765 | |

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 3/9/2007.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 26 and 77-82 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 26 and 77-82 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 12/10/2001 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) , Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Claim Rejections - 35 USC § 103

1. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

2. This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

3. Claims 26, 77, 78, 81, and 82 are rejected under 35 U.S.C. 103(a) as being unpatentable over Yang et al. (US 5,976,222).

Yang discloses, " . . . a fluorochemical containing exhaust gas from a semiconductor fabrication facility conducting an etch or clean process step is provided in stream 12 comprising a diluent gas, such as nitrogen, and fluorochemicals comprising potentially NF₃, SF₆, CF₄, CHF₃, CH₃F, C₂F₆, C₂HF₅, C₃F₈, C₄F₈, HF, F₂ and mixtures of these gases. Additional components in this mixture include; CO, CO₂, H₂O,

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O₂, CH₄, SiF₄, SiH₄, COF₂, N₂O, NH₃, O₃, Ar, Br₂, BrCl, CCl₄, Cl₂, H₂, HBr, HCl, He and SiCl₄ (column 7, lines 5-12). The aforementioned reads on,

A plasma etching composition.

Yang fails to disclose respectively in claims 26, 77, and 81-82, an example of Applicants' specific combination of two fluorocarbons and ammonia, wherein at least two fluorocarbons are selected from the group consisting of fluorohydrocarbons, chlorofluorocarbon, and chlorofluorohydrocarbons; at least one fluorocarbon, ammonia and oxygen; and at least one of oxygen and nitrogen, in addition to the rest of the limitations of claims 26 and 78.

However, it would have been obvious to one having ordinary skill in the art at the time the invention was made to select any combination of etchant gases as taught in the Yang reference, including Applicants' claimed etchants that would effectively accomplish the disclosed composition because these etchants gases are used for etching and cleaning operations in the fabrication of various electronic materials from electronic materials including the construction of integrated circuits (column 5, lines 16-22).

Furthermore, since a gas is matter that occupies space and has random motion and since Yang discloses a mixture of etchant gases, then it would have been obvious that Yang's combination of fluorochemical gases and additional gases such as NH₃ and O₂ would result to form a reactive mixture, **as recited in claims 26, 77 and 78.**

4. Claims 79 and 80 are rejected under 35 U.S.C. 103(a) as being unpatentable over Yang (US '222) as applied to claim 78 above, and further in view of Smith (US 6,277,733 B1).

While Yang fails to disclose wherein at least one of said at least two fluorocarbons is CH_2F_2 , **in claim 79** and wherein said at least two fluorocarbons are CF_4 , CHF_3 , and CH_2F_2 , **in claim 80**.

Smith discloses a wafer is subjected to a plasma containing other fluorocarbons, such as C_2F_6 , CHF_3 , CH_2F_2 (column 4, lines 34-37).

Hence, it would have been obvious to one having ordinary skill in the art at the time the invention was made to modify Yang by selecting any combination of fluorocarbons in the Smith reference for the purpose of removing hydrocarbon residue left on metal structure (column 4, lines 41-43).

Response to Arguments

5. Applicant's arguments filed 3/9/2007 have been fully considered but they are not persuasive. Applicant traverses the rejection of claims 26, 77, 78, 81, and 82 under 35 U.S.C. §103(a) over Yang et al. (US 5,976,222) as failing to teach a plasma etching composition comprising at least two fluorocarbon and ammonia, wherein said at least two fluorocarbons and said ammonia form a reactive mixture, and wherein said at least two fluorocarbons are selected from the group consisting of fluorohydrocarbons, chlorofluorocarbons, and chlorofluorohydrocarbons.

As to claims 26, 77, 78, 81, and 82, Applicant argues Yang's fluorochemical containing exhaust gas is from a semiconductor fabrication facility and cannot be used as a plasma etching composition and argues the Office Actions misinterprets Yang's etchant mixture of NF_3 , SF_6 , CF_4 , CHF_3 , CH_3F , C_2F_6 , C_2HF_4 , C_3F_8 , HF , F_2 and mixtures of these gases (column 7, lines 5-11) as meaning a semiconductor fabrication facility conducts a process using one etching composition that may include any of these gases. Applicant argues, Yang teaches the exhaust gas may "potentially" comprise NF_3 , SF_6 , CF_4 , CHF_3 , CH_3F , C_2F_6 , C_2HF_4 , C_3F_8 , HF , F_2 and mixtures of these gases (column 7, lines 5-11) and not all of these components may be used in an etching step and in a cleaning step. Applicant further argues Yang fails to specify which of these components may be used in an etching step and which may be used in a cleaning step. Also the components for cleaning composition are not necessary suitable for etching composition:

Applicant's arguments are acknowledged but are unpersuasive because Yang illustrates a fluorochemical containing exhaust gas from a semiconductor fabrication facility conducting an etch or clean process step is provided in stream 12 comprising a diluent gas, such as nitrogen, and fluorochemicals comprising potentially NF_3 , SF_6 , CF_4 , CHF_3 , CH_3F , C_2F_6 , C_2HF_5 , C_3F_8 , C_4F_8 , HF , F_2 and mixtures of these gases. Additional components in this mixture include; CO , CO_2 , H_2O , O_2 , CH_4 , SiF_4 , SiH_4 , COF_2 , N_2O , NH_3 , O_3 , Ar , Br_2 , BrCl , CCl_4 , Cl_2 , H_2 , HBr , HCl , He and SiCl_4 (column 7, lines 12) comprises chemicals similar to the chemicals in Applicant's etching composition rather than an exhaust gas that may "potentially" comprises NF_3 , SF_6 , CF_4 , CHF_3 , CH_3F ,

C_2F_6 , C_2HF_4 , C_3F_8 , HF, F_2 and mixtures of these gases. Hence, it would have been obvious to one having ordinary skill in the art at the time of the claimed invention to select any combination of gases as taught by Yang, including Applicant's specifically claimed etching composition that would effectively accomplish the disclosed composition because Yang's gases have been used in etching and cleaning operations in the fabrication of various electronic materials including the construction of integrated circuits (column 5, lines 16-22). Also, since gas is a state of matter that occupies space and has random motion, then it would have been obvious to one having ordinary skill in the art at the time the invention was made to have combined Yang's exhaust gas and additional gases of NH_3 and O_2 , which would result to form a reactive mixture. Since Yang's gases comprises similar gases as those claimed by Applicant, then using Yang's gases in the same manner as in the claimed invention would result the same in the etching composition of the present invention.

Applicant argues the Office Action fails to provide proper motivation to modify the reference or to combine reference teaching and argue the teaching or suggestion to make the claimed combination must be found in the prior art and because the motivation does not suggest the desirability of the claimed invention.

In response to applicant's argument that there is no suggestion to combine the references, the examiner recognizes that obviousness can only be established by combining or modifying the teachings of the prior art to produce the claimed invention where there is some teaching, suggestion, or motivation to do so found either in the

references themselves or in the knowledge generally available to one of ordinary skill in the art. See *In re Fine*, 837 F.2d 1071, 5 USPQ2d 1596 (Fed. Cir. 1988) and *In re Jones*, 958 F.2d 347, 21 USPQ2d 1941 (Fed. Cir. 1992). In this case, the reason to combine would have been obvious to one having ordinary skill in the art at the time the invention was made in order to select any combination of etchant gases as taught in the Yang reference, including Applicants' claimed etchants that would effectively accomplish the disclosed composition because these etchants gases are used for etching and cleaning operations in the fabrication of various electronic materials from electronic materials including the construction of integrated circuits (Yang, column 5, lines 16-22).

Applicant also traverse the rejection of claims 79 and 80 under 35 U.S.C. §103(a) over Yang et al. (US 5,976,222) as applied to claim 78, and further in view of Smith (US 6,277,733 B1) for the reasons as set forth above. Applicant further argues Smith fails to cure the deficiencies of Yang and has not provided proper motivation to combine the references because combining a component from Smith's clean-up step with a component in Yang's etching step would not result in a combined cleaning and etching step as suggested by the Office Action.

Yang's failure to disclose wherein at least one of said at least two fluorocarbons is CH₂F₂, **in claim 79** and wherein said at least two fluorocarbons are CF₄, CHF₃, and CH₂F₂, **in claim 80** is acknowledged. However, Smith cures Yang's deficiency by teaching a wafer is subjected to a plasma containing other fluorocarbons, such as C₂F₆,

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CHF₃, CH₂F₂ (column 4, lines 34-37). Hence, it would have been obvious to one having ordinary skill in the art at the time the invention was made to modify Yang by selecting any combination of fluorocarbons in the Smith reference for the purpose of removing hydrocarbon residue left on metal structure (Smith, column 4, lines 41-43).

In response to Applicant's argument that the chemical component in Smith's cleaning step and the chemical component in Yang's etching step would not result in a combined cleaning and etching step as suggested by the Office Action is unpersuasive because Yang's fluorochemical containing exhaust gas from a semiconductor fabrication facility conducting an etch or clean process step is provided in stream 12 comprising a diluent gas, such as nitrogen, and fluorochemicals comprising potentially NF₃, SF₆, CF₄, CHF₃, CH₃F, C₂F₆, C₂HF₅, C₃F₈, C₄F₈, HF, F₂ and mixtures of these gases and additional components in this mixture include; CO, CO₂, H₂O, O₂, CH₄, SiF₄, SiH₄, COF₂, N₂O, NH₃, O₃, Ar, Br₂, BrCl, CCl₄, Cl₂, H₂, HBr, HCl, He and SiCl₄ (column 7, lines 5-12). Hence, Smith's components are used in a cleaning process and Yang's components are used either in cleaning or etching process, thereby making Smith and Yang references analogous art.

Conclusion

6. **THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within

TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Lynette T. Umez-Eronini whose telephone number is 571-272-1470. The examiner is normally unavailable on the First Friday.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Nadine Norton can be reached on 571-272-1465. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

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May 23, 2007

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SUPERVISORY PATENT EXAMINER
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